Modulator-Demodulator Unit SM2004

Instruction Manual

SM2004

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Instruction Manual

MODULATOR – DEMODULATOR UNIT SM 2004

ISSUE 1

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LIST OF AMENDMENTS

Al.No.	By Whom	Date

Al.No.	By Whom.	Date.

PREFACE

DAMAGE IN TRANSIT

Unpack the equipment and examine it thoroughly to ascertain whether any damage has occurred in transit. Report immediately any such damage to the agent or manufacturer. Retain the four rubberized packing surrounds, should a return to manufacturer be necessary.

GUARANTEE

2. All goods manufactured by the Company are guaranteed to the extent hereafter mentioned against defects arising from faulty material or workmanship subject to the goods not having suffered maltreatment or interference. The Company's liability under this guarantee is limited to replacing any part or parts found defective within a period as laid down in Company instructions after the date of delivery or installation.

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LOCAL AGENTS ADDRESS:-

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DESCRIPTIVE MATTER AND ILLUSTRATIONS.

Descriptive matter, illustrations, dimensions and weights issued by the Company are typical and shall not be held as binding. The Company reserves the right to alter patterns and designs without notice.

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SECTION 1

SPECIFICATIONS

1. Modulator Section

Carrier Frequency:	50 Hz to 10 kHz
Carrier Input Voltage:	6 V r.m.s. to 250 V r.m.s.
Modulation Input Voltage:	10 V peak (max)
Input Impedance (balanced or floating):	2 M Ω (200 kΩ with Function switch set to MOD BAL)
Modulation frequency:	0 to 1.5 kHz (the lower sideband frequency must be > 10 Hz).
Modulator Output Voltage:	10 V peak (suppressed carrier), 20 V peak (with carrier bias)
Output Controls:	Coarse and Fine output level controls and 1V/10V multiplier push-buttons
Output Setting Resolution:	1mV peak on 1 V(peak) multiplier range
Output Impedance:	1 V Range: 10 Ω (max) 10 V Range: 100 Ω (max)
Oscilloscope (C.R.O.) Output:	5 V peak+ carrier bias and is dependent on coarse and fine settings.
Carrier Bias:	Adjustable from 0 to 10 V peak by a 1-turn potentiometer
Carrier Phase Shift:	(i) 50 Hz to 2.4 kHz: 1.5^{O} (max) (ii) 10 kHz: 6^{O} (max)

2. Demodulator Section

Input Ranges:	10mV, 100mV, 1V, 10V, 100V, 300V peak full scale.
Input Impedance:	(i) 10mV range: 100 kΩ (50 kΩ to centre tap) (ii) All other ranges: 1 MΩ (500 kΩ to centre tap)
Dynamic Range:	300 %
Measurement Accuracy at (± 5% phase shift):	(i) 50 Hz to 2.4 kHz: ± 0.5% (ii) 10 kHz: ± 1%
Common Mode Rejection:	(i) 50 Hz to 2.4 kHz: dB (ii) 10 kHz: dB
Quadrature Rejection:	26 dB
Carrier Bias:	Adjustable from 0 to 10 V peak by a single-turn potentiometer.

Demodulator Output:	1 V pk of modulation frequency component at full scale input (measured with modulation Frequency at less than 10% of filter setting). Unfiltered output available from rear panel.
Source Impedance:	2.2 kΩ
Output Filters:	Selected by 3-position switch giving 20 dB attenuation at 50 Hz, 400 Hz and 2.4 kHz.
Carrier Input:	Normally derived from the carrier input to the modulator. Separate carrier of different frequency can be applied to the demodulator.
Separate Carrier Input Requirements:	(i) Voltage Input: 6V r.m.s. (nominal) (ii) Input Impedance (w.r.t. earth): 100 kΩ
Demodulator Output Waveform Monitoring Facility:	Oscilloscope output socket producing 1V peak for f.s.d. on all demodualtor input range settings. (frequency at less than 10 % of filter setting)

3. Power Requirements

Voltage Range:	(i) 115V ± 15% (ii) 230V ± 15%
Frequency Range:	45 Hz to 440 Hz
Power Consumption:	10 VA (approx)

4. Dimensions

Height: 3.5 in

Width: 17 in

Depth: 18.5 in

Weight: 6 kg

SECTION 2

INSTALLATION AND OPERATION

1. GENERAL DESCRIPTION

1.1. Modulator/Demodulator Unit SM 2004 (fig. 2.1.) allows the Frequency Response Analyser SM 2001 to be used on all types of systems employing a.c. carrier techniques. The unit is electronically divided into two main sections:

(a) *Modulator Section.* This creates the product of the input signal and carrier signal giving 'suppressed carrier' modulation. A carrier can be added to this product to give amplitude modulation.

(b) *Demodulator Section.* This consists of a high gain amplifier, feeding a phase-sensitive rectifier followed by an R.C. filter circuit. Carrier bias can be added to this to remove any d.c. present on the output.

1.2. The modulator and demodulator sections can be fed with the same or two different carrier frequencies. Both sections can be used independently where the system-under-test has a.c. carrier information only on its input or output.

1.3. The carrier, modulator and demodulator connections are internally isolated by transformers, making the instrument ideal for use with complex carrier systems where earth loops and other common mode signals might otherwise be a problem.

1.4. Provision is made to add or subtract the carrier bias signal to or from both the modulator output and demodulator input. A steady state command (consisting of a d.c. component and an a.c. component) can be, therefore, applied to the system-under-test, enabling it to be set initially to a specific position and also enabling elimination of any carrier unbalance in the return waveform-to-be-measured.

1.5. The output signal of the demodulator is available, after filtering, at a front panel socket for monitoring on an oscilloscope. This socket is earth referenced and produces a 1V peak output for full scale deflection on all demodulator input range settings.

1.6. The modulated output waveform can also be monitored by an oscilloscope at a front panel socket. The source impedance is 1 kΩ. The signal is mains earth referenced and is isolated from the output terminals.

2. UNPACKING

2.1. The instrument is supplied sealed in a polythene bag and is surrounded by rubber packing blocks. These should be retained for use again if further transportation is likely.

3. RACK MOUNTING

3.1. The SM 2004 can be bench or rack mounted. A system of rack sliding supports is fitted along the sides of the instrument and extensions are added to either side of the front panel so that it can be held in place on the rack. This system is available in kit form as an optional extra. The SM 2004 can also be mounted on the top of Frequency Response Analyser SM 2001 to form a composite unit. Clearance of at least 1 inch must be allowed between units for adequate cooling.

FIG 2.1 MODULATOR – DEMODULATOR UNIT SM 2004

4. MAINS (POWER) SOURCE CHECKS

4.1. The instrument can be operated on mains voltages of 115V r.m.s. ± 15% or 230 V r.m.s. ± 15% and between mains frequencies of 45 Hz and 440 Hz. A label is attached to the instrument denoting the mains voltage to which the instrument has been set. This should be checked.

4.2. To alter the mains setting to agree with the local mains source, a system of links must be altered on a special tagstrip mounted internally at the rear of the instrument. It is advised that this task is performed by S.E. Laboratories personnel only.

4.3. Connect a suitable plug to the mains lead:

Colour	Function
Brown	LIVE
Blue	NEUTRAL
Green/Yellow	EARTH (GROUND)

4.4. Check that a fuse is inserted in the fuseholder on the rear panel. The value of this fuse should be 500 mA antisurge for 115 V and 250 mA antisurge for 230 V mains inputs.

5. SUMMARY OF CONTROLS AND CONNECTORS

5.1. The controls and connectors are discussed under the mains sections, Modulator and Demodulator with the exception of the Function Selector which is common to both, and is therefore considered separately.

5.2. Modulator Section (fig. 2.2)

(a) CARRIER HIGH:LOW Terminals: The carrier signal for the modulator (and, in normal use the demodulator) is connected to these terminals (see also 5.3. (a).)

(b) CARRIER RANGE I/P Controls: These controls are used when calibrating the modulator (see Para. 6.2. (f)).

(c) SOCKET SKT 1 (Rear Panel): The modulating signal input is connected to pins A1 (high) and B1 (low) of this 18-way socket.

(d) OUTPUT HIGH:LOW Terminals: The output of the modulator is taken from this pair of terminals and is completely isolated. The LOW terminal can be connected to the green earth terminal (on the Demodulator Section) for earthed systems.

(e) OUTPUT CRO Socket: This socket is for monitoring the modulated output waveform. The source impedance is 1 kΩ. The signal is with respect to mains earth, and is isolated from the output terminals.

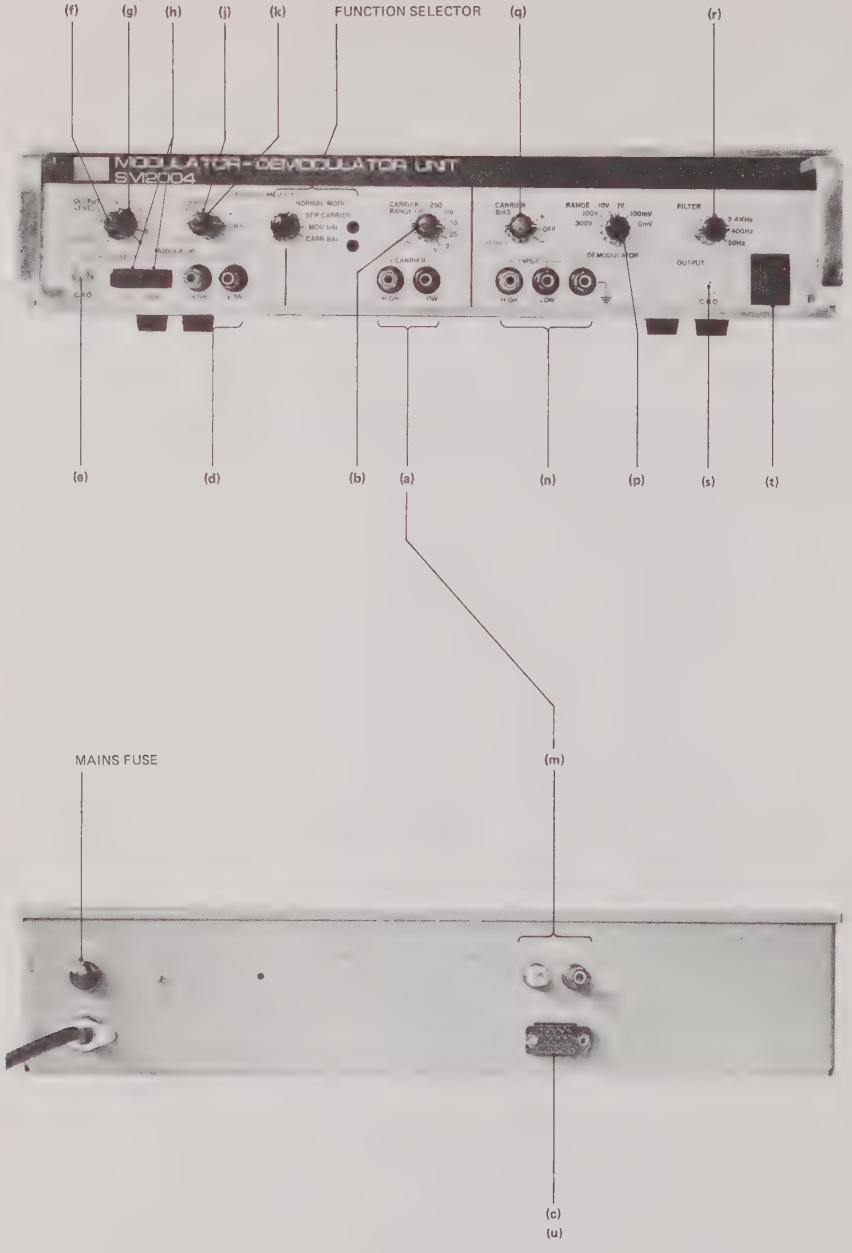

FIG 2.2 CONTROLS AND INDICATORS

(f) OUTPUT LEVEL Selector:

This is a ten-position rotary switch providing coarse control of the output amplitude. The output selected on this switch is either 0 to 0.9V or 0 to 9V, depending upon which Multiplier push-button has been depressed (see (h)) below).

(g) OUTPUT LEVEL (FINE) Control:

This potentiometer control is concentric with the OUTPUT LEVEL Selector and provides linear interpolation (with 10% overrange) between coarse switch settings, except on the maximum setting (9). Here full clockwise rotation of the (FINE) control gives a maximum of 1V peak or 10V peak.

(h) MULTIPLIER Push-buttons 1V 10V :

With 1V position selected, all positions of the OUTPUT LEVEL Selector are multiplied by 0.1 With the 10V position selected, all positions of the OUTPUT LEVEL selector are multiplied by 1.

NOTE: These push-buttons affect both the modulated signal output AND the carrier bias output.

(j) CARRIER BIAS + OFF - Switch:

(i) + Position. At this position, a carrier signal can be added to the output signal of the modulator. The amplitude is then varied by the associated concentric (FINE) potentiometer (see (k) below).

(ii) OFF Position. When the carrier bias signal is required (during normal operation), this position is selected. The associated, concentric (FINE) potentiometer is inoperative.

(iii) – Position. At this position a carrier bias signal can be subtracted from the output signal of the modulator. The amplitude is then varied by the associated, concentric (FINE) potentiometer (see (k) below).

(k) CARRIER BIAS (FINE) Control:

A one-turn potentiometer, concentric with the CARRIER BIAS switch. It affects the bias carrier amplitude only. The maximum amplitude is 10 V peak with 10 V multiplier push-button selected.

5.3. Demodulator Section (fig. 2.2.)

(a) CARRIER HIGH: LOW Terminals: and SEPARATE REFERENCE Terminals:

The carrier input signal is connected to the HIGH: LOW terminals (and is normally derived from the same source as used for the Modulator). If it is required that the input signal should be demodulated at a separate carrier frequency, the separate carrier signal should be connected to the rear panel SEPARATE REFERENCE terminals. The input level should be between 5V and 7 V r.m.s.

(b) INPUT IN PHASE:CENTRE TAP: ANTI PHASE Terminals:

The signal-to-be-demodulated is connected to these terminals which are isolated.
Connect a floating or balanced input to the IN PHASE: ANTI PHASE terminals. Connect a 'one side grounded' signal to IN PHASE or ANTI PHASE: CENTRE TAP terminals. The input impedance will be half that shown in the table below. The input impedance varies with the position of the RANGE switch:

Range	I/P Impedance
10 mV pk.	100 k
100 mV	1 M
1 V	1 M
10 V	1 M
100 V	1 M
300 V	1 M

(c) RANGE Switch:

This is a 5-position rotary switch selecting full scale input ranges of 10 mV, 100 mV, 1 V, 10 V, 100 V and 300 V peak (see (b) above).

(d) CARRIER BIAS + OFF — Switch and (FINE) Potentiometer:

(i) + Position: At this position, a carrier bias (internal or separate carrier) signal can be added to the demodulator input signal and the amplitude varied by the 1-turn (FINE) control, concentric with the switch.

(ii) OFF Position: At this position, no carrier bias signal is used and the (FINE) potentiometer is inoperative.

(iii) —Position: At this position, a carrier bias signal can be subtracted from the demodulator input signal and the amplitude varied by the (FINE) control.

(e) FILTER Switch:

A 3-position rotary switch used to filter the output signal of the demodulator. Each position selects an R-C filter giving 20 dB attenuation of the frequency selected (50 Hz, 400 Hz, 2.4 kHz).

(f) OUTPUT CRO Socket:

The output signal of the demodulator is available after filtering at this socket for monitoring on an oscilloscope. The socket is earth referenced.

(g) POWER Push-Button:

When depressed, the POWER push-button is illuminated and mains is applied to the SM 2004.

(h) Demodulator Output:

This is taken from the rear panel socket SKT 1, pins A4 (high) and A 5 (low). Unfiltered output, pins B3 (high) and B4 (low).

5.4. Function Selector (fig.) 2.2.)

A 5-position rotary switch with positions as follows:

(i) MEASURE MOD O/P. At this position, the INPUT terminals of the demodulator are connected internally to the d.c. modulator output pins of SKT 1, used when calibrating the modulator.

(ii) NORMAL MODE: This position is selected when it is required that the carrier signal to the demodulator is supplied from the same source as that applied to the modulator, (the carrier signal applied to the CARRIER HIGH: LOW terminals drives both modulator and demodulator.

(iii) SEP. CARRIER: This position is selected when separate carrier signals are to be used. The separate carrier for the demodulator is applied to the SEPARATE REFERENCE terminals on the rear panel.

(iv) MOD. BAL. At this position, the modulator can be balanced by adjustment of the associated preset potentiometer, to give a minimum output of less than 200 mV peak-to-peak of carrier frequency as monitored on the modulator CRO OUTPUT socket.

(v) CARR BAL.: At this position, the carrier can be balanced by adjustment of the associated preset potentiometer, to give a minimum peak-to-peak output of less than 200 mV on the modulator CRO OUTPUT socket. After setting the modulator balance and carrier balance set the function selector to NORMAL MODE and check that no clipping of the output waveform occurs. If clipping does occur, the CARRIER RANGE switch should be set to the next (higher) range.

NOTE: Drift in the modulator is very small and any resulting unbalance in carrier or modulation does not significantly affect the SM 2004. It is therefore unnecesarry to frequently re-adjust the preset potentiometers. Correction for a large unbalance (due to unbalancing in the modulator input signal giving rise to unwanted products of modulation) can be effected by adjustment of the MOD BAL potentiometer.

6. OPERATING INSTRUCTIONS

6.1. Initial Setting-up Procedure.

(a) Set the CARRIER BIAS switch on the modulator and demodulator to OFF.

(b) Rotate the (FINE) CARRIER RANGE I/P control to fully anticlockwise.

(c) Set the FILTER switch to 2.4 kHz.

(d) Depress the 10V multiplier push-button, and set the modulator OUTPUT LEVEL Selector to 9. Rotate the associated (FINE) control fully anti-clockwise(to minimum).

(e) Set the demodulator RANGE switch to 10V peak.

(f) Connect the carrier input to the CARRIER HIGH:LOW terminals.

(g) The modulating input signal required for the SM 2004 should be 20V p-p (balanced or floating) and this is applied to socket 1, pins A1 (high) and B1 (low) on the rear panel.

6.2. Setting-up the SM 2004 *WITH* SM 2001

(a) Connect the output signal of the demodulator on SKT 1, pins A4 (high) and A5 (low), to the CORRELATOR INPUT terminals on the SM 2001.

(b) Connect the GENERATOR OUTPUT terminals (see Para. 6.1. (g) above) on the SM 2001 to the modulating input signal pins on socket 1 of the SM 2004. The modulating signal must be either balanced or floating. The SM 2001 supplies a floating signal. All other equipments, such as earthed instruments, must be disconnected from the GENERATOR OUTPUT terminals to prevent unbalance of the modulating signal.

(c) Repeat steps 6.1 (a) to (g) above and then set the controls on the SM 2001 as follows:

(i) Switch-on the SM 2001 and depress the RUN push-button (this starts the generator output waveform).

(ii) Set the generator output frequency to 80 Hz, by depressing the SET F push-button and selecting the appropriate FREQUENCY RANGE button.

(iii) Set the AMPLITUDE switch to 10 V. Depress the SET V push-button and use the UP: DOWN push-buttons to set 9.99 V.

(iv) Set the correlator INTEGRATION CYCLES control to 10.

(v) Set the correlator DISPLAY selector to P(polar).

(vi) Set the correlator MEASUREMENT selector to ABSOLUTE 1V.

NOTE: The settings for the generator output (9.99V) and correlator input MEASUREMENT Selector (Absolute 1 V) should always be used when the SM 2004 is used with the SM 2001.

(d) Switch on the SM 2004.

(e) Balance the Modulation and Carrier as follows:-

(i) Balance the modulation by selecting MOD BAL on the function selector and adjusting the associated preset potentiometer to give the minimum peak-to-peak output (less than 200 mV) on the modulator CRO OUTPUT socket.

(ii) Balance the carrier by selecting CARR BAL on the function selector and adjusting the associated preset potentiometer to give the minimum peak-to-peak output (less than 200 mV) on the modulator CRO OUTPUT socket. Set the function selector to NORMAL MODE and check that the output waveform is not clipped. If it is, the carrier input is too high for the setting of the CARRIER RANGE switch. Increase the range setting until the clipping is removed. See also Para. 5.4. (v).

(f) Calibrate the Modulator as follows:

(i) Set the function selector to MEASURE MOD O/P.

(ii) Take readings on the SM 2001 by depressing the MEASURE push-button. Adjust the coarse CARRIER RANGE I/P selector and the associated (FINE) potentiometer until the SM 2001 reads 0.999 ± 0.003 in the centre display.

(iii) Set the function selector to NORMAL MODE. The OUTPUT LEVEL selector on the modulator is now calibrated to within ± 5%. An exact setting of any output level can now be obtained by adjustment of the OUTPUT LEVEL (FINE) potentiometer and measuring the output voltage on the SM 2001, by setting the function selector to MEASURE MOD O/P.

6.3. Testing a System using SM 2004 *WITH* SM 2001

CAUTION

When the SM 2004 is used with the SM 2001 and has been set-up and calibrated as described in Para. 6.2., it is not necessary to touch any controls on the SM 2001, except the MEASURE push-button. The functions of the generator output voltage controls and correlator input (MEASUREMENT) selector on the SM 2001 are transferred to the SM 2004.

6.3.1. To test a system, the units are connected as shown in fig. 2.3. The level of input to the system (modulator output) is set by adjusting the OUTPUT LEVEL selector and associated (FINE) control on the SM 2004.

6.3.2. The output of the system-under-test is connected to the INPUT terminals of the demodulator. The range selector on the demodulator should be set to give the maximum resolution on the SM 2001 display. The dynamic range of the demodulator is about 3 times the full scale input range on all positions of the RANGE selector except the 300V position. The SM 2001 indicates an overload condition whenever the input to it exceeds 1.5V, in which instance, the demodulator input sensitivity must be reduced.

6.3.3. The carrier source must have a stable output, any fluctuation is directly reflected in the measurements made.

6.3.4. The OUTPUT CRO sockets (on the modulator and demodulator sections of the SM 2004) can be connected to an oscilloscope to ascertain that the SM 2004 is not itself overloading.

Interpretation of Displayed Readings.

6.3.5. The readings on the SM 2001 are displayed with reference to the RANGE selector setting on the SM 2004. For this reason, the displayed position of the decimal point is not always correct and reference should be made to the tables shown below.

(a) Cartesian (c) and Polar (P) Display Modes.

SM 2004 Range Setting	Displayed SM 2001/Reading (V)	True Value
10 mV	X. XXX	XX.XX mV
100 mV	X.XXX	XXX.X mV
1 V	X.XXX	X.XXX V
10 V	X.XXX	XX.XX V
100 V	X.XXX	XXX.X V
300 V	X.XXX	0.3 times XXX.X V

NOTE: In the cartesian mode, the above table applies to centre and R.H. displays. In the polar mode, it applies to the centre display only.

(b) Log Polar (P/DB) Display Mode.

SM 2004 Range Setting	SM 2001 Displayed Reading (dB)	True Value
10 mV	- XXX.X	-XXX.X -40 dB
100 mV	- XXX.X	-XXX.X -20 dB
1 V	- XXX.X	-XXX.X
10 V	- XXX.X	-XXX.X + 20 dB
100 V	- XXX.X	-XXX.X + 40 dB
300 V	- XXX.X	-XXX.X + 49.5 dB

6.3.6. An example of a reading in each display mode is given below.

(a) Cartesian (C): If the input signal to the demodulator is 25.4V and the demodulator input RANGE selector is set to 100V, then assuming there is no phase shift, the SM 2001 displays 0.254 in the centre display and 0.000 in the R.H. display. Reference is then made to the table in Para. 6.3.5. (a) for the true value.

(b) Polar (P) : If the input signal to the demodulator is 73.5 mV and the demodulator input RANGE selector is set to 100 mV, then assuming there is no phase shift, the SM 2001 displays 0.735 in the centre display and 000.0 in the R.H. display. Reference is then made to the table in Para. 6.3.5 (a) for the true value.

(c) Log Polar (P/DB): If the input signal to the demodulator is 20 mV and the demodulator input RANGE selector is set to 100 mV, then assuming there is no phase shift, the SM 2001 displays -034.0 dB in the centre display and 000.0 in the R.H. display. Reference is then made to the table in Para. 6.3.5. (b) for the true value.

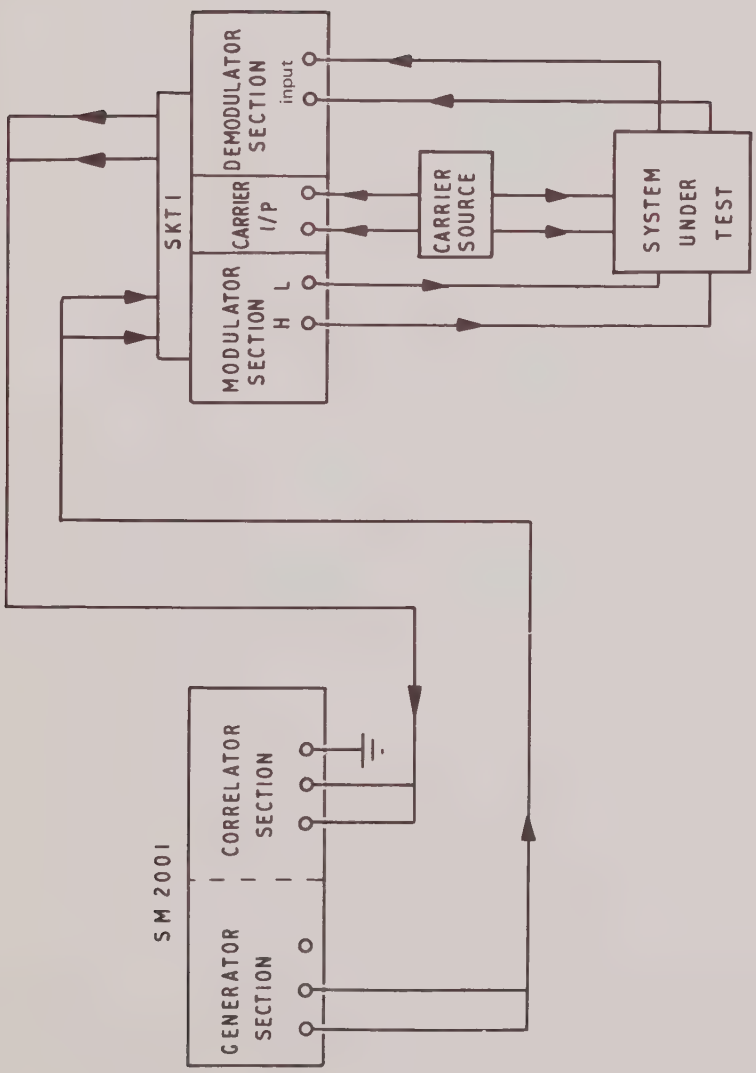

FIG 2.3 TESTING A SYSTEM– 2004 with 2001

6.4. **Setting up the SM 2004 *WITHOUT* SM 2001.**

6.4.1. In this test system, the modulating signal is provided by a source ***other*** than the SM 2001 generator. The modulating signal should be 20 V peak-to-peak (max), floating or balanced and should be connected to pins A1 and B1 of socket SKT 1 on the rear panel.

6.4.2. To calibrate the modulator proceed as follows:

(a) Carry-out the steps detailed in Para. 6.1, Initial Setting-up Procedure.

(b) Disconnect the modulating signal and connect in its place a known d.c. voltage level (floating) between 6V and 10V.

(c) Set the function selector to MEASURE MOD O/P.

(d) Connect a digital voltmeter (of ± 0.1% accuracy) to the demodulator output pins on SK 1 on the rear panel (at MEASURE MOD O/P the output of the demodulator is internally connected to these pins).

(e) Adjust the CARRIER RANGE I/P Selector and associated (FINE) control until the digital voltmeter reads exactly 0.09 times the d.c. input voltage applied in (b) above.

(f) Disconnect the d.c. input voltage and connect in its place, the modulating signal. Some adjustment of the balance preset controls may be required (see Para. 6.2. (e)).

(g) Set the Function selector to NORMAL MODE.

6.5. **Testing a system using SM 2004 *without* SM 2001.**

6.5.1. When the SM 2004 has been set-up and calibrated as described in Para. 6.4, the OUTPUT LEVEL switch (and control) on the modulator is calibrated to within ± 5%.

6.5.2. To test a system, the test rig is connected up as shown in Fig. 2.4.

(a) Set the required input level for the system-under-test by setting the modulator OUTPUT LEVEL switch and (FINE) control.

(b) Connect the output of the system-under-test to the INPUT HIGH : LOW terminals of the demodulator.

(c) Set the input RANGE switch on the demodulator to obtain maximum resolution on the response measuring unit.

NOTE: The demodulator has a dynamic range approximately 3 times the full scale input, except on the 300V range.

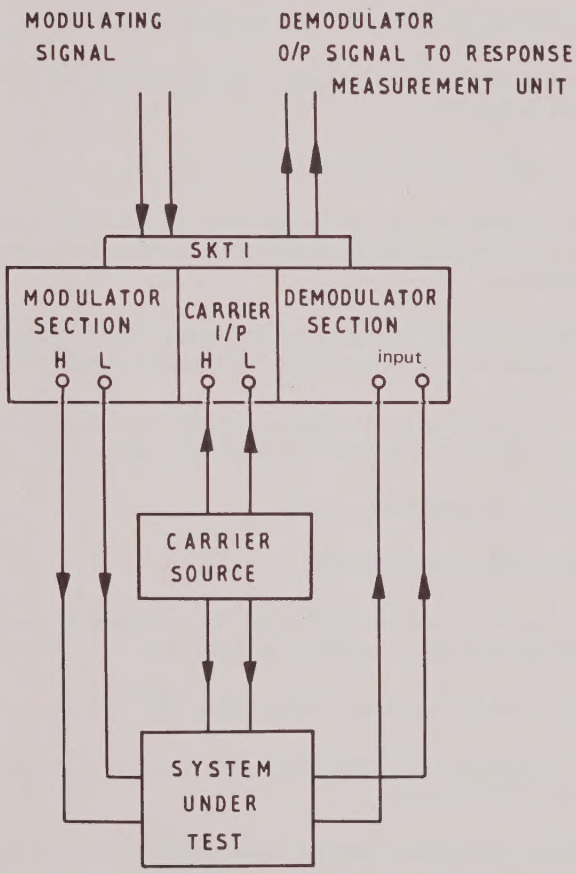

FIG 2.4 TESTING A SYSTEM– 2004 without 2001

6.4. Setting up the SM 2004 *WITHOUT* SM 2001.

6.4.1. In this test system, the modulating signal is provided by a source ***other*** than the SM 2001 generator. The modulating signal should be 20 V peak-to-peak (max), floating or balanced and should be connected to pins A1 and B1 of socket SKT 1 on the rear panel.

6.4.2. To calibrate the modulator proceed as follows:

(a) Carry-out the steps detailed in Para. 6.1, Initial Setting-up Procedure.

(b) Disconnect the modulating signal and connect in its place a known d.c. voltage level (floating) between 6V and 10V.

(c) Set the function selector to MEASURE MOD O/P.

(d) Connect a digital voltmeter (of ± 0.1% accuracy) to the demodulator output pins on SK 1 on the rear panel (at MEASURE MOD O/P the output of the demodulator is internally connected to these pins).

(e) Adjust the CARRIER RANGE I/P selector and associated (FINE) control until the digital voltmeter reads exactly 0.09 times the d.c. input voltage applied in (b) above.

(f) Disconnect the d.c. input voltage and connect in its place, the modulating signal. Some adjustment of the balance preset controls may be required (see Para. 6.2. (e)).

(g) Set the Function selector to NORMAL MODE.

6.5. Testing a system using SM 2004 *without* SM 2001.

6.5.1. When the SM 2004 has been set-up and calibrated as described in Para. 6.4., the OUTPUT LEVEL switch (and control) on the modulator is calibrated to within ±5%.

6.5.2. To test a system, the test rig is connected up as shown in Fig. 2.4.

(a) Set the required input level for the system-under-test by setting the modulator OUTPUT LEVEL switch and (FINE) control.

(b) Connect the output of the system-under-test to the INPUT HIGH:LOW terminals of the demodulator.

(c) Set the input RANGE switch on the demodulator to obtain maximum resolution on the response measuring unit.

NOTE: The demodulator has a dynamic range approximately 3 times the full scale input, except on the 300V range.

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